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ABSTRACT

A study was undertaken to explore the relationship of mothers' language to infant development in terms of the infants' development of sensorimotor intelligence. Specifically, the study chronicled the infants' advances in sensorimotor development from J. Piaget's Stage II to Stage III as a possible explanation for changes in maternal language. It was hypothesized that advancement of an infant from Stage II (primary circular reactions) to Stage III (secondary circular reactions) would precede any major shifts in the language of the mother and that changes observed in the mother's language would have to do with pragmatics rather than syntax or semantics. The subjects were three infants and their mothers. The infants were between eight and ten weeks old when the study began and were studied during interactions with their mothers for approximately five months. The findings confirmed both hypotheses. In addition, the results supported the existence of a link between cognition and language acquisition at an earlier stage than previously demonstrated and strengthened the argument of the Piagetian school that language and cognition are interdependent in development. (FL)

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Mother's Use of Language as a Function of the Infant's Level of Sensorimotor Development

by

Anne Widerstrom, Ph.D.

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The relationship of mothers' language to infant development is an important aspect of the study of language acquisition. The present study explored that relationship in terms of the infants' development of sensorimotor intelligence.

Statement of the Problem

Recent research in the field of developmental psycholinguistics has revealed a strong link between cognitive development and the emergence of language. Studies by Edmonds (1976), Bates (1975, 1977), and Ingram (1978), among others, appear to suggest that achievements during the sensorimotor period, particularly Stages V and VI, are precursors to language acquisition. Edmonds (1976) found Stage VI representation (demonstrated by symbolic play) to be a prerequisite for language used as a context-free sign system. The research of Bates and her colleagues supports the hypothesis of Bloom (1973) and Sinclair (1973) that referential speech follows the emergence of symbolic play and object permanence at Stage VI.

Results of Ingram's study indicated that Stage V in general and the development of imitation in particular are necessary for the onset of multiword sentences (syntax).

Thus there appears to exist evidence that cognitive development during the sensorimotor period is related to development of referential

language. That the former directly causes the latter seems questionable; the above studies suggest that they are both dependent on development of an underlying symbolic structure. Differences of opinion exist as to which Stage VI achievements are necessary for language. Symbolic play, imitation and means-end appear to be the strongest precursors, with object permanence less strong than once was thought.

Earlier development has also been the subject of study. These studies have examined the linguistic environment of the infant by focusing on maternal communication. Bruner (1975), for example, has suggested that in the mutual play between mother and infant the baby learns role-shifting from agent of action to recipient of action and learns that conversation requires taking turns.

Several authors (Lewis and Freedle, 1978; Tronick, Brazelton and Als, 1978; Lewis and Cherry, 1977; Sylvester-Bradley and Trevarthen, 1978; and Ninio and Bruner, 1978) have noted that these early mother/infant communications are orderly, sequential, rule-governed and ritualistic.

Up to the present time the study of mother/infant interaction related to language acquisition has primarily focused on the behaviors of the mother. Little attention has been paid to the very young infant in terms of what behaviors are emitted which may provide cues to mothers or other caregivers to alter their own language to the child. The present study focused on specific sensorimotor behaviors of the infant which appear to influence maternal language. It is an attempt to extend the research of Catherine Snow (1977) who noted that certain pragmatic changes occurred in mothers' language when their infants were between 5 and 7 months old. Snow accounted for these changes in the mothers'

use of a conversational model when the infant was as young as 3 months. The present study chronicles the infants' advances in sensorimotor development, specifically from Piaget's Stage II to Stage III, as a possible explanation for the changes. The relationship between these changes in maternal language and the infant's advancement in sensorimotor development were investigated in order to extend to an earlier stage the link between sensorimotor development and language acquisition established by Bates, Bloom, Sinclair and others at Stages V and VI.

The study is based on the assumption that mothers do not innately know that when their infants approach 5 months of age it is time to begin speaking differently to them. It is instead suggested that the infant's behaviors are read and interpreted by the mother, and that she alters her language accordingly. It is hypothesized that certain behaviors of the infant at Stage III (ages 4 to 8 months according to Piaget) act as cues which cause the mother to begin altering her language in order to prepare the baby for language learning. Piaget (1952) calls Stage III the transition between preintelligent operations and truly intelligent ones. It is at this stage that the infant begins to distinguish means from ends. His or her coordinated schemes become activities related to the external environment, not merely performed for their own sake as at Stage II (primary circular reactions). In other words, the infant becomes interested in the world outside his own body at this stage, the world of objects and people, and his behavior begins to become intentional. It is logical that the increased cognitive awareness represented by attainment of Stage III will be noticed by the mother and responded to. It is likely that these new behaviors of the infant

affect the mother's communication. The purpose of the present study was to identify these behaviors, to record their effect on maternal language, and to identify the specific time frame in which these interactions occur.

The following hypotheses were tested: (1) Advancement of an infant from Stage II (primary circular reactions) to Stage III (secondary circular reactions) will precede any major shifts in his mother's language; (2) the changes observed in the mother's language will have to do with pragmatics rather than syntax or semantics (based on Snow's results, 1977).

Subjects and Procedures

The subjects of the study were three infants, two boys and one girl, and their mothers. Each infant was between 8 and 10 weeks old when the study began, and was studied during interactions with his mother for approximately 5 months; that is, from the time he was in Stage II of sensorimotor development until he was solidly into Stage III. To allow comparisons with other research on language acquisition, the mother/infant dyads were of middle class socioeconomic background. To be eligible for the study the infants had to be approximately 2 months old and exhibiting at least seven of the eleven Stage II behaviors listed in Table 1, and no Stage III behaviors.

Each infant's behavior in relation to his mother's speech was examined during three distinct time periods which were defined in terms of the infant's level of cognitive development. Time I consisted of the first interactional behaviors recorded, beginning when each infant was

at Stage II of the sensorimotor period as defined above. Time II defined a transitional period when an infant exhibited between two and eight of the Stage III behaviors listed in Table 1 but continued to exhibit Stage II behaviors as well. Time III was defined by the infant's attainment of at least 9 of the 13 Stage III behaviors. Table 2 may clarify these time periods.

The mother/infant dyads were observed at home during one session every other week during Times I, II and III. Each session consisted of 30 minutes of interaction between mother and infant recorded on 1/2-inch videotape, plus a series of tasks presented to the infant by the author to elicit sensorimotor behavior. These tasks, listed in Table 1 with examples, are those described by Piaget (1952) as typical of Stage II and Stage III, respectively. The study was terminated three weeks after each infant gave solid evidence of having achieved Stage III.

Following each taping session the tapes were transcribed by the author and by trained graduate students. Infant behaviors were coded in order to identify level of sensorimotor functioning; mother's language was coded according to communicative function and the pragmatic categories of reference, repetition and imitation. Frequencies in each category were obtained and expressed as proportions (percentages) of total utterances per session.

Interrater reliability was checked for each code before it was used and then once for each dyad during each month of the study. Reliability rates for coding of mothers' language ranged from .83 to .92 when averaged across the three time periods. Coefficients for coding infant behaviors ranged from .86 to .95.

Results

Patterns of Infant Sensorimotor Development

The three infants were remarkably similar in their movement through the three time periods. At the beginning of the study all three were between 2 and 2 1/2 months of age and demonstrated five or six of the Stage II behaviors and no Stage III behaviors, placing them at Time I. Table 2 may help to clarify the acquisition process which follows.

At 4 months of age two of the infants, Kate and Danny, demonstrated ability to perform two or three of the Stage III tasks, thus entering Time II. Jeremy entered Time II one month later, at 5 months of age, by demonstrating performance of two Stage III behaviors.

At 6 months of age Jeremy was performing 12 of the Stage III tasks and thus quickly entered Time III. Kate and Danny each achieved Time III at 6 1/2 months, demonstrating ability to perform 11 and 9 Stage III tasks, respectively. Whereas Jeremy required only one month to move from Stage II to Stage III of sensorimotor development, Kate and Danny required 2 1/2 months to make the transition. Nevertheless, all three babies followed rather closely the time table described by Piaget for the attainment of Stage III. When the study was terminated the three babies were between 7 and 8 months of age. Kate at that time was exhibiting all 13 of the Stage III behaviors; Jeremy was exhibiting 12; and Danny was exhibiting 10 of them.

The infants not only achieved Stage III in a similar fashion quantitatively, but in a qualitative sense as well. Their timetables for emergence of specific tasks were almost identical. If the Stage III tasks are examined across babies, a consistent ordinality is apparent

in their acquisition. It appears that infants attain these behaviors in a rather fixed sequence closely related to chronological age. Tables 3 and 4 illustrate the consistency across the three babies of acquisition of these Stage III behaviors. The ordinality reflects the infant's incipient awareness of cause and effect and an early ability to predict future events. These developments characterize Stage III, which heralds the infant's first understanding of intentionality.

The ability to make interesting events last, for example, one of the first Stage III behaviors to emerge, requires an awareness on the part of an infant that he is responsible for an event. This accomplishment is closely followed by the emergence of the abilities to imitate gestures and to localize the source of sounds. These also require an understanding of causality, i.e., who or what is responsible for the gesture or sound? An example of this awareness was provided by Kate when she imitated her father clapping his hands. It was apparent that she understood that what he was causing to happen, she could also make happen. Finally, the acknowledgment of causality inherent in the infant's touching the mother's hand to demand more food is at the same time a remarkable display of intentional behavior.

Closely associated with the ability to discern cause and effect is the ability to predict what will happen to an object if something is done to it. This ability is apparent in the Stage III child who learns, for example, that kicking a clown will make it squeak, or that dropping a rattle will result in its landing in a certain place, or that the entire object will be found under a scarf if part of it is uncovered and therefore visible. These behaviors are quite sophisticated compared to

those of Stage II, and demonstrate an increased awareness of the environment on the part of the infant.

Stage III is also characterized by a greatly increased ability to interact with objects. Whereas the Stage II baby is able to merely track objects visually or smile at them, and to grasp them only if they are encountered by chance, the Stage III baby reaches for them, grabs them, brings them to his mouth, watches them fall from the high chair, and so on. These interactions are intentional in nature; they represent an increased interest in the surrounding environment.

Finally, the deferred circular reaction, the final Stage III behavior to be attained by all three babies, requires that the infant return to a task after being interrupted from it. This would appear to require some form of memory, and indeed the behavior of all three infants during this task indicated that they remembered what they were doing when interrupted and desired to return to that activity. Jeremy, for example, was engrossed in squeezing a yellow frog when his mother interrupted him with a teething biscuit. Jeremy examined the biscuit, tasted it, then put it down and picked up the frog again. Another example is Kate, who learned to blow a whistle, and this delighted her. Several times she was distracted from it by an adult but she returned each time to pick it up and blow it, smiling with pleasure. Although Stage III memory may not consist of the complex ability to represent past experience of which a 2-year-old child is capable, the intention to continue a previous activity is clearly present.

Thus all of the Stage III behaviors reflect in some way the infant's development of intention. This expanded awareness of the environ-

ment and an incipient control over it appear to be important cues to the mother that the baby is ready for a different kind of communication, one centered on objects in the environment rather than on the baby and more informational than affective. This is an important point to keep in mind as we discuss the changes in maternal language that were observed during Time III.

In addition, it is interesting to note that the Stage III behaviors discussed above represent early evidence of means-end (causality), imitation and object permanence, the Stage VI achievements which have been identified as precursors of referential speech. It seems logical that the infant's demonstration of incipient development in these areas may cue his mother to make alterations in her language in order to prepare him for later language learning.

Maternal Language

The most important result of the study was the confirmation of the first hypothesis. That is, each infant entered Time III, which represented the solid attainment of Stage III, approximately two weeks before a dramatic shift in reference occurred on the part of the mother. Whereas during Times I and II she spoke exclusively about the child whenever she used reference, at Time III each mother quite suddenly began talking much more about objects either by themselves or in relation to the child. This can be seen in Table 5 under the pragmatic category of reference. Whereas at Times I and II objects or child-objects were referenced much less often than the child, at Time III these percentages suddenly were reversed causing increases in the child/object category

of between 10 and 20 percentage points. This dramatic shift in reference occurred for each mother approximately two weeks after her infant entered Time III. That is, the same time that the babies became strongly established in Stage III of sensorimotor development, the three mothers began to talk much more to them about objects. References to objects at Time III were 2 to 3 times greater than at Time I, as Table 5 shows. The fact that this change occurred at precisely the time each infant was emerging in Stage III of sensorimotor development and beginning the use of intentional behaviors, according to Piaget, makes it logical to infer that the baby's increased sensorimotor cognizance cues the mother to begin talking less about the child himself and to begin talking more about the child in relation to objects in the environment. She responds to his increased cognitive awareness, defined by his Stage III behaviors, by helping him to expand his world through talking about objects, people and events within that world. Although she continues to talk to and about him, the focus of her language at Stage III is very different. She talks about where he is going, what he is looking at, what he wants to play with, rather than focusing exclusively on how he feels or what he looks like, as she tended to do during Stage II. She talks about her infant's interaction with objects, and this has important implications for later language learning. If a baby's first words reflect his sensorimotor knowledge of objects, encoding the relationship among agent, action and object, it seems logical that mothers encourage their Stage III babies to engage in the role of agent acting upon objects in order to prepare them for later learning of these basic semantic relations.

Table 5 provides other data concerning the pragmatic quality of the mother's language. From these data it can be seen that the mothers' language became increasingly referential, that they used a high rate of repetitions, and used very little imitation. Nearly all studies that have examined the language of mothers to their young children have identified the high rate of repetition used. The present study is no exception. At Time I repetitions by all three mothers were extremely high, ranging from 25 percent to 43 percent of total utterances. There was a decrease in their use from Time I to Time III. Results of the present study suggest that repetition is used not to increase the child's language-learning facility, but rather as a means of maintaining a warm, close interaction between mother and baby. Repetitions are also necessary during the early months because the mother has to carry the entire burden of the conversation herself, and repetitions are one way she can accomplish this. As the infant becomes able to take more and more responsibility for the conversation by the use of gestures and vocal efforts, less repetition is necessary. By the time the child is beginning to speak, that is, at the time of most previous studies of repetition, there is little need for conversation-maintaining, and other reasons for repetitions such as teaching may then come into play. It is quite possible, however, that even at these later stages repetition may serve as the means used by the adult to maintain the child's attention and to keep a conversation going, just as it is used with much younger infants.

Finally, it was found that the language of the mothers in the present study was mainly affective in function, rather than directive or tutorial.

This trend declined from Time I to Time III, and the mothers' communication became somewhat more directive. This decrease in affective function appears to complement the increase in utterances that contain reference. Mothers appear to use more of their language to Stage III infants for regulatory and teaching tasks than for social interaction as to Stage II infants. Thus the second hypothesis of the study was also confirmed, for the basic changes in mothers' language which occurred at Time III were found in pragmatic rather than syntactic or semantic aspects.

In fact, the syntactic and semantic analyses of the mothers' language in the present study revealed characteristics that have been identified in maternal language to older language-learning children. That is, their language was found to consist of short sentences in the present tense with few inflectional endings, few embedded clauses and few auxiliary verbs. They talked mostly about the baby in relation to his surroundings. They also communicated in a way that teaches the baby to respond: They asked many questions which aided in maintaining a warm interaction.

These results support the conclusion that structurally simple language is available to babies at 2 months and 7 months of age, just as it is to children of 2 years of age. Indeed, Roger Brown has suggested (1973) that such language is also used by adults speaking to senile older people and to pet animals. Therefore, the link between sensorimotor development and language acquisition does not appear to be found in these syntactic or semantic forms but rather in the communicative aspect, the pragmatic boundaries that define the social, verbal and conceptual interactions between infant and mother.

Implications

The intent of the present study was to extend to earlier sensorimotor stages the link between cognition and language acquisition proposed by Bates and her colleagues, Bloom and Lahey, Edmonds, Ingram and others in studies of children at Stages V and VI. The findings of this study support the evidence of such a link. These results are seen to strengthen the argument of Piaget and the Genevan school that language and cognition are interdependent in development.

Further research is warranted to determine whether other adults in caregiver roles also respond to babies as mothers do. It would be intereesting to learn whether fathers, for example, are as affective in their language with Stage II infants as mothers are, whether they become more informational/directive with Stage III infants and whether they are sensitive to the infant's advancement from Stage II to Stage III in the referential content of their language. Preliminary research by the author on the language of one father indicated that his language was less affective and more tutorial than his wife's during all time periods. Further research could determine to what extent such patterns are determined by the adult's personality, for example. At any rate, this is an important area for future research given the increasing number of fathers who are more fully participating in child rearing.

The question of whether infant caregivers in institutional settings (e.g., pre-schools, day care centers, programs for handicapped children) are as attuned to infant sensorimotor development as mothers are has important implications. If the mother's language changes at Stage III are crucial to the infant's later language development, then attention

needs to be given to the language of caregivers who may be the primary source of language to the infant. This is an area where much research is necessary. It is possible that institutional caregivers need to be taught to modify the content and structure of their languate in order to better meet the developmental needs of their young charges.

Additionally, if it is the behavior of the infant that cues the mother, a logical assumption of the present study, then we must consider what happens to delayed or disabled infants who do not give the proper cues at the proper time. Perhaps such infants need to be encouraged to move through the snesorimotor tasks at each successive stage, as well as to respcnd to the modified language of the caregiver. New patterns of interaction may have to be taught to both caregiver and infant.

Finally, the results of the present study indicate that syntactically and semantically simple language is available to normal infants soon after birth and throughout their language-learning years. This needs to be reflected in infant curricula, upon which there is much emphasis at the present time. In addition, the content and focus of adult language to infants should receive attention in curriculum planning. The importance of talking to the Stage III infant about his surroundings, particularly about objects in his environment, should be reflected in both language development and language remediation programs.

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Table 1. Infant's Sensorimotor Behaviors at Stage II and Stage III[1]

Sensorimotor Behavior	Definition	Example
	Interest in the Physical World	
Stage II		
1. Visual tracking	Follows objects with eyes in horizonal arc for at least five seconds.	Infant follows the path of a red ball held above his head and moved in an arc from his right side to his left.
2. Staring at object	Looks at object without turning away for at least ten seconds. May state at spot it disappears.	Stares at mobile over crib.
3. Grasps object encountered by chance	If an object touches his hand by accident or adult's intention, baby grasps it. May or may not show awareness by looking at hand or object.	Baby's hand accidentally touches edge of quilt in crib and he grasps it
4. Looks toward source of sound	Interrupts previous activity to attend to sound other than human voice by looking in general direction of it. May not localize it accurately.	Turns head and looks toward bell ringing to one side.
5. Smiles or laughs at objects	Shows interest and pleasure in object by regarding it for at least five seconds while smiling or laughing.	Infant smiles or laughs at mobile rotating above his head in crib.

Table 1. Infant's Sensorimotor Behaviors at Stage II and Stage III (Cont.)

Sensorimotor Behavior	Definition	Example
6. Vocalizes at object	Shows interest in object by regarding it for at least five seconds vocalizing.	Infant coos while staring at mobile above crib.
Stage III		
1. Follows trajectory of falling object	a. Searches for dropped object in direction in which it fell. b. Visually anticipates where falling object will land.	Infant drops toy and looks toward floor where object will land.
2. Reaches for and grasps object	Visually directed reaching	Infant looks at, then reaches for a toy and holds it. May place toy in mouth (see 7).
3. Grasps for object lost or dropped	Looks for and reaches for object in direction in which it fell.	Infant drops toy and reaches toward floor where object has landed.
4. Searches for partially hidden object	Pulls screen away to reveal object sought.	Infant pulls handkerchief off that is partially hiding a familiar toy.
5. Performs procedures to make interesting event of activity last	Maintains an interesting spectacle through hitting, shaking, vocalizing, waving arms or kicking legs to keep an object moving.	Kicks side of crib with both feet in order to make mobile attached to it move.
6. Coordinates sucking and prehension	Places objects in mouth that were obtained through visually directed reaching	Infant looks at, then grasps a toy, brings it to mouth and sucks it.

Table 1. Infant's Sensorimotor Behaviors at Stage II and Stage III (Cont.)

Sensorimotor Behavior	Definitions	Example
7. Touches adult hand after adult demonstrates an activity	Touches adult hand to indicate understanding that adult cuased the activity.	Touches adult hand to request repetition of making the car go.
8. Localizes source of sound correctly	Turns head and looks accurately at source of sound.	Looks at door when someone knocks on it from outside.
9. Deferred circular reaction	Returns to activity involving an object when interrupted.	Child absorbed in examining toy or familiar implement (e.g. spoon) puts it down when adult interrupts, but immediately returns to it.
	Interest in the Social World	
Stage II		
1. Looks toward source of human voice	Interrupts previous activity to turn head and eyes in general direction of human voice, either mother or other. May not localize sound exactly.	baby looks toward mother when she speaks to him from across the room.
2. Stares at human face	Looks at human face without turning away for at least five seconds.	Baby stares at mother's face.

Table 1. Infant's Sensorimotor Behaviors at Stage II and Stage III (Cont.)

Sensorimotor Behavior	Definition	Example
3. Smiles or laughs at persons and/or sounds they make	Shows interest and pleasure in person by regarding him/her for at least five seconds while smiling or laughing.	Infant smiles at mother.
4. Vocalizes at persons	Shows interest in person by regarding him/her for at least five seconds while vocalizing.	Infant coos at mother as she talks to him.
5. Responds to imitations of own sounds	Shows interest in own sounds when they are imitated by adult by looking, smiling, laughing or vocalizing for at least five seconds.	Mother says "Oh-h-h-h!" after infant says it. Infant waves arms and smiles.
Stage III		
1. Imitates adult imitation of own sounds	When adult imitates a sound made by baby, baby succeeds in imitating the adult rendition.	Baby says, "Da-da-da-da!" Mother imitates baby, then baby says again, "Da-da-da."
2. Imitates gestures made by adult	When adult makes a gesture; infant tries to imitate it. (May not succeed.)	Adult sticks out tongue or waves bye-bye and infant tries to imitate.
3. Imitates familiar sounds made by adult	When adult makes a sound familiar to infant (but not one of infant's own sounds), infant tries (but may not succeed) to reproduce it.	Adult says "La-la-la-la." Infant says, "Ah-a-a."

[1] Adapted from Piaget (1952), Uzgiris and Hunt (1975), Ginsburg and Opper (1969).

Table 2. Achievement of Stage III Behaviors By Time Period

Infant	Time Period I		Time Period II		Time Period III	
Kate Chronological Age (Month, Days)	2;0	3;22	4;1	5;18	6;21	7;25
Number of Stage III Tasks Demonstrated	0	0	2	6	11	12
Danny Chronological Age (Month, Days)	2;12	3;28	4;12	5;23	6;14	6;27
Number of Stage III Tasks Demonstrated	0	1	3	5	9	10
Jeremy Chronological Age (Months, Days)	2;7	4;0	5;4	5;18	6;4	6;25
Number of Stage III Tasks Demonstrated	0	1	2	5	12	12

Time I represents infant at Stage II of Sensorimotor period.
Time II represents transition between Stage II and Stage III (demonstration of 2-8 Stage III Tasks)
Time III represents infant's solid attainment of Stage III (demonstration of 9-13 Stage III Tasks)

Table 3

Order in Which Tasks Achieved by Each Infant

Time	Task	Jeremy	Kate	Danny
I-II	Coordinates sucking and prehension	1	1	2
I-II	Reaches for and grasps object	2	2	1
II	Makes interesting events last	3	4	2
II	Follows trajectory of falling object	3	3	3
II	Visual anticipation of an object	3	3	5
II	Looks toward place object will land	3	3	3
II-III	Localizes sounds source	4	4	4
II-III	Imitates gestures	4	5	5
II-III	Imitates adult vocalizations of own sounds	-	5	-
III	Grasps for object dropped	4	6	5
III	Searches for partially hidden object	4	6	5
III	Touches adult's hand for performance	4	6	5
III	Deferred circular reaction	5	7	6

Table 4

Ordinality of Emergence of Stage III Behavior by Time Period

KATE	DANNY	JEREMY
	TIME I	
	1/24 1. Reaches for and grasps object	1/22 1. Coordinates sucking and prehension
	TIME II	
1/17 1. Coordinates sucking and prehension		
2. Reaches for and grasps object	2/8 2. Coordinates sucking and prehension Makes interesting events last	2/26 2. Reaches for and grasps object
3. Follows trajectory Visual antic. Looks⟶landing place	3. Follows trajectory	3. Makes interesting events last. Follows trajectory. Visual antic.
4. Makes interesting events last Localizes sound	4. Localizes sound	
5. Imitation-gestures and vocalizes		
	TIME III	
4/6 6. Grasps object dropped. Touches adult. Searches/partially hidden.	4/10 5. Imitation-gestures Grasps object dropped. Touches adult. Visual antic. Searches/partially hidden	3/26 4. Localizes sound. Grasps object lost. Searches for part hidden. Imitates gestures. Interrupted prehension. Deferred cir. reaction
7. Deferred cir. reaction.	6. Deferred cir. reaction	

Table 5

Mean Frequencies in Each Pragmatic Category for Each Mother at Times I, II, and III

	Mean Percent of Total Utterances											
	Jeremy's Mother			Kate's Mother			Danny's Mother			Total		
	TIMES			TIMES			TIMES			TIMES		
Pragmatic Category	I	II	III	I	II	III	I	II	III	I	II	III
Reference	58	53	62	62	61	71	48	69	60	56	61	64
Object + Child/ object	19	32	43	16	26	43	22	25	47	19	28	44
Child	57	55	43	62	51	35	57	51	31	59	52	36
Object	11	25	24	12	17	37	18	12	33	14	18	31
Person	3	1	3	5	6	9	2	4	3	3	4	5
Mother	6	5	1	10	6	5	9	6	5	8	6	4
Child/Object	8	7	19	4	9	7	4	13	14	5	10	13
Child/Mother	8	3	5	3	6	5	7	12	10	6	7	7
Repetition	25	21	20	41	34	34	43	31	25	36	29	26
Imitation	.8	3	.8	3	4	7	.5	.3	.7	1.4	2.4	3